Chapter 38 – OSHA Regulated Carcinogen Control Program (REDACTED)

38.1 Purpose

This chapter establishes the minimum requirements of the Ames Research Center OSHA Regulated Carcinogen Control Program. The Carcinogen Control Program involves identifying, evaluating and controlling occupational exposures to OSHA-regulated carcinogens. Carcinogens may only be used when it is not possible to use a non-carcinogenic material. Any use of carcinogens requires stringent controls to be in place to prevent exposures to workers, the public, and the environment. The Carcinogen Control Program is designed to meet the requirements of the Occupational Safety and Health Administration's (OSHA) chemical specific standards.

38.2 Applicability

This chapter is applicable to:

- All Ames Research Center employees
- All work conducted under the authority of Ames, and
- All equipment and property managed by Ames.

For Ames contractors, it is applicable through contract clauses in conformance with NASA Procurement Regulation (REDACTED) All other personnel will follow the provisions of this chapter while at Ames facilities.

This program provides Ames Research Center policies and procedures for handling the OSHA regulated carcinogens listed in Table 1.

Table 1

Chemical Name	CAS Number	OSHA Regulation	Other Requirements
2-Acetylaminoflourene	53-96-3	1910.1003-13 Carcinogens	1910.1014
Acrylonitrile	107-13-1	1910.1045	
4-Aminodiphenyl	92-67-1	1910.1003-13 Carcinogens	1910.1011
Inorganic Arsenic and compounds	7440-38-2	1910.1018	
Asbestos	1332-21-4	1910.1001	APG 1700.1, Chapter 30
Benzene	71-43-2	1910.1028	
Benzidine	92-87-5	1910.1003 - 13 Carcinogens	1910.1010
1,3-Butadiene	106-99-0	1910.1051	
Cadmium and compounds	7440-43-9	1910.1027	

Chemical Name	CAS Number	OSHA Regulation	Other Requirements
bis-Chloromethyl ether	542-88-1	1910.1003 - 13 Carcinogens	1910.1008
Chloromethyl methyl ether	107-30-2	1910.1003 - 13 Carcinogens	1910.1006
1,2-Dibromo-3-chloropropane	96-12-8	1910.1044	
3',3'-Dichlorobenzidine	91-94-1	1910.1003 - 13 Carcinogens	1910.1007
4-Dimethylaminoazobenzene	60-11-7	1910.1003 - 13 Carcinogens	1910.1015
Ethyleneimine	151-56-4	1910.1003 - 13 Carcinogens	1910.1012
Ethylene oxide	75-21-8	1910.1047	
Formaldehyde (and formalin)	50-00-0	1910.1048	
Methylene chloride	75-09-2	1910.1052	
4,4'-Methylenedianiline	101-77-9	1910.1050	
a-Naphthylamine	134-32-7	1910.1003 - 13 Carcinogens	1910.1004
b-Naphthylamine	91-59-8	1910.1003 - 13 Carcinogens	1910.1009
4-Nitrobiphenyl	92-93-3	1910.1003 - 13 Carcinogens	
N-Nitrosodimethylamine	65-75-9	1910.1003 - 13 Carcinogens	1910-1016
b-Propiolactone	57-57-8	1910.1003-13 Carcinogens	1910.1013
Vinyl chloride	75-01-4	1910.1017	

Additional sources of information.

Asbestos: http://www.osha.gov/SLTC/asbestos/index.html
Benzene: http://www.osha.gov/SLTC/benzene/index.html
1,3-Butadiene: http://www.osha.gov/SLTC/butadiene/index.html
Cadmium: http://www.osha.gov/SLTC/cadmium/index.html
Carcinogens: http://www.osha.gov/SLTC/carcinogens/index.html
Ethylene Oxide: http://www.osha.gov/SLTC/ethyleneoxide/index.html
Formaldehyde: http://www.osha.gov/SLTC/formaldehyde/index.html
Methylene Chloride: http://www.osha.gov/SLTC/methylenechloride/index.html
General information on occupational cancer: http://www.cdc.gov/niosh/occancer.html

38.3 Authority

NPR 1800.3	NASA Environmental Health
NHB 2710.1	NASA Occupational Safety and Health Handbook
29 CFR 1960	Basic Program Elements for Occupational Safety and Health Programs
Executive Order 12196	Occupational Safety and Health Programs for Federal Employees
OSHA Publication 2014	Occupational Safety and Health Programs for Federal Agencies

38.4 Background

There are two basic types of chemical-handling operations at Ames: laboratory and non-laboratory. Laboratory use means:

- Chemical manipulations are carried out on a laboratory scale (containers for reactions, transfers, and other handling can be easily and safely manipulated by one person);
- Multiple chemical procedures or chemicals are used; and
- Procedures involved are not part of a production process, nor do they in any way simulate a production process.

People who work in laboratories often use small quantities of many chemicals, including carcinogens. The OSHA Laboratory Standard applies to research laboratories, and exempts them from the OSHA substance-specific standards. The Ames Chemical Hygiene Plan (Chapter 13) addresses the OSHA Laboratory Standard. Controls that apply only to laboratories are addressed in the Ames Chemical Hygiene Plan.

All other chemical handling operations are defined as non-laboratory use. The OSHA substance-specific standards were designed for these operations. Controls that apply to both laboratories and non-laboratories or only to non-laboratories are addressed in this chapter.

38.5 Definitions

38.5.1 Acronyms/Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
ARC	Ames Research Center
CAS	Chemical Abstract Number
CFR	Code of Federal Regulations
CHP	Chemical Hygiene Plan
HAZCOM	Hazard Communication
IARC	International Agency for Research on Cancer
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
NTP	National Toxicology Program
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PPE	Personal Protective Equipment

SOP	Standard Operating Procedure
TLV®	Threshold Limit Value
TWA	Time-Weighted Average

Action level--An exposure level, calculated as an eight-hour time-weighted average, which initiates certain required activities, such as exposure monitoring, medical surveillance, training and record keeping.

Chemical Inventory--A written or electronic record of chemicals used in a laboratory, by container, which includes the chemical name of all ingredients, CAS number(s), manufacturer, size of container, owner, and location. See Chapter 24, Chemical Hazard Communication (Ames HAZCOM), for specific information on the Ames inventory procedures.

Hazardous Chemical--Any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. If a hazardous chemical comprises 1% (0.1% for carcinogens) or greater of a compound or mixture, the compound or mixture must be treated as a hazardous chemical.

Laboratory--A facility in which research or analytical chemical procedures are performed, where hazardous materials are stored and used in quantities that may easily be handled by one person (container sizes do not exceed five gallons); a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

Material Safety Data Sheet (MSDS)--Written, printed or electronically transmitted information on the hazards and properties of a particular material, including instructions for its safe use. See the Code Q website for several links (Code Q)

OSHA-regulated Carcinogen--Those compounds, listed in Table 1, that have been identified by the Occupational Safety and Health Administration as carcinogens. Mixtures containing 0.1% or 1000 parts per million of an OSHA-regulated carcinogen are covered by this chapter.

Note: Under the Ames CHP, OSHA-regulated carcinogens are included in the definition of "select carcinogens." The "select carcinogen" list is more comprehensive and includes more chemicals. See the Ames Chemical Hygiene Plan, Chapter 13 for more information.

Permissible Exposure Limit (PEL)--Limit established by OSHA, usually expressed as an 8-hour Time Weighted Average (TWA), meaning an airborne contaminant concentration that shall not be exceeded for any 8-hour work shift of a 40-hour workweek. Exposure limits for many hazardous materials are listed in 29 CFR 1910.1000. (OHSA PELs)

Personal Protective Equipment (PPE)--Devices and clothing designed to be worn or used for the protection or safety of an individual while in potentially hazardous areas or performing potentially hazardous operations. Includes chemical and thermal resistant gloves, safety glasses, goggles and face shields, aprons, respirators, earplugs and muffs, etc.

Regulated Area--Limited access work area for substance regulated by a specific OSHA standard.

Short-term exposure limit--A limit usually defined as a 15-minute time-weighted average.

Threshold Limit Value (TLV-TWA)--The exposure limit (established by American Conference of Governmental Industrial Hygienists), expressed as a time-weighted average airborne "concentration for a normal 8-hr workday and a 40-hr work week, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect."

Toxic--The ability of a material to injure biological tissue.

Training--A documented, organized presentation of information fulfilling educational objectives and regulatory requirements.

38.6 Responsibilities

38.6.1 Safety Division

Responsibilities include:

1. Oversee development and implementation of the Ames Carcinogen Program and applicable procedures.
2. Review the Ames chemical inventory annually to identify the locations and operations where OSHA-regulated carcinogens are used.
3. Provide advice, oversight, and consultation, when requested, to Ames line management to ensure compliance with relevant regulations and policies for procurement, use, and disposal of carcinogens.
4. Review proposed use, as requested by a supervisor or chemical user, of carcinogenic chemicals and the proposed precautions used to protect employees, including specific designated work areas and PPE.
5. Provide direction and oversight of Ames chemical monitoring programs, ensuring that exposure assessments are conducted as needed and that exposure monitoring records are maintained.
6. Notify employees of the results of exposure monitoring, and provide copies of such records to the Ames Health Unit for retention in the individual's medical record.
7. Provide for periodic review and update, as needed, of this program.
8. Provide an annual report to the Executive Safety Committee describing the extent of carcinogen use at ARC, the methods in place to ensure safe handling of carcinogens and a summary of the exposure monitoring performed.

38.6.2 Line Management

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38.6.3 Ames Health Unit

The medical staff at the Ames Health Unit responds to requests for consultation, examination and evaluation, emergency treatment, and medical monitoring for personnel who work with or may be exposed to hazardous materials. Responsibilities include:

1. Perform medical consultations and medical examinations, as well as provide written medical opinions as specified in the OSHA regulations, as appropriate.
2. Establish and maintain appropriate medical records covering the consultations and examinations (including tests and written opinions) and records of exposures to hazardous chemicals.
3. Inform each employee of the results of any examination/test given.

38.6.4 Environmental Services Division

REDACTED

38.6.5 Employees

REDACTED

38.6.6 Contracting Officer's Technical Representative (COTR)

REDACTED

38.7 OSHA-Regulated Carcinogen Program Implementation

This section describes the policies and procedures that implement the Ames OSHA-regulated carcinogen program.

38.7.1 Requirements

1. Identify whether the work area falls under the Laboratory Standard or not. Laboratories must follow the Ames Chemical Hygiene Plan (see Chapter 13). Non-laboratories must meet the chemical specific standard.
2. Identify carcinogens.
   - Table 1 contains OSHA-regulated materials that have specific work practice and handling requirements. The Safety Division can provide compliance information.
   - Complete the "Regulated Carcinogen Use Questionnaire" from Appendix A and send a copy to the Safety Division.
3. Analyze and document the hazards of the work.
   - Laboratories: The principal investigator is responsible for analyzing operations involving carcinogens to determine the hazard(s) and necessary control measures. OSHA-regulated carcinogens are included in the category of "select carcinogen" under the Chemical Hygiene Plan. They must be handled as "Particularly Hazardous Substances" and meet the requirements listed in the Chemical Hygiene Plan (section 13.7 Chemical Hygiene Plan Implementation).

     The following elements must be documented, reviewed, and approved by the supervisor before work begins:
     - Establishment of a designated area. The area can be a single hood, a portion of a room or the entire laboratory. Identify the designated area in the laboratory safety plan.
     - Use of containment devices such as fume hoods or glove boxes. Specify the hood location and number in the laboratory safety plan.
     - Procedures for safe accumulation and removal of contaminated waste.
     - Decontamination procedures. Refer to the MSDS or contact the Ames Chemical Hygiene Officer for information.
     - Leak detection systems.

     The provision for additional controls may require the expertise and recommendations of various groups including the Safety Division, Facilities Engineering, and technical committees. All additional provisions for work with particularly hazardous materials must be incorporated into the standard operation procedures for those materials.
   - Non-laboratories: Use the information on the MSDS, product label, or vendor's literature to determine whether a regulated carcinogen is present. Check Table 1. OSHA requires that these materials must be listed on the MSDS if their concentration exceeds 0.1%. Review the OSHA applicable standard. Hyperlinks are listed in the table. Code QH can be contacted for assistance.

4. Mitigate the hazards and document hazard control measures.

   Handling requirements

   - General Requirement for laboratories. A safety plan is required for carcinogen operations. Laboratory supervisors can use their laboratory safety plan to meet this requirement. Contact the Safety Division for assistance.
   - General Requirements for non-laboratories. Each substance specific standard has slightly different requirements, however, the items listed below are required for all regulated carcinogens and must be discussed in the safety plan. The Job Hazard Analysis and PPE assessment should be included as part of the safety plan.
     - The Safety Division must be notified of the names of employees working with carcinogens, the chemical names and size of the chemical containers, the location of use, and the location of storage. Completion of Appendix A satisfies this requirement.
     - Workers must have received required training (as defined in the substance specific standard) and must be authorized by management to work with carcinogens.
     - A regulated area must be assigned to carcinogen work and storage. Regulated areas must have access controlled by either administrative or physical means. The requirements of the appropriate OSHA standard must be met. Contact the Safety Division for details.
     - All areas where OSHA-regulated carcinogens are used or stored must have posted warning signs. Eating, drinking, or applying of cosmetics is not allowed in these areas.
     - All materials containing 0.1% or more of a listed carcinogen must be labeled as a carcinogen hazard.
     - Employees must know accident and spill response requirements.
     - Decontamination procedures for restoring equipment and facilities to uncontrolled use must be available before new carcinogens are used. These procedures must be described in the Safety Plan.
5. Medical Surveillance
   - Enrolling an employee in the Medical surveillance program is based on:
     - Known exposure to a carcinogen, as documented by exposure sampling data obtained by the Safety Division
     - Presumed exposure until carcinogen use exposure sampling data is acquired
     - Voluntary participation
   - A worker who is participating in medical surveillance because of a regulatory requirement or because of known exposure to a carcinogen shall remain enrolled until the end of his/her employment, even if carcinogen use ceases.

Table 2 briefly outlines the basic requirements that are common to the OSHA-regulated carcinogens. Table 3 lists records that are required.

Table 2

Requirement	
Written Safety Procedure	
	Exposure assessment to determine applicability of regulation.
	Establish and post regulated area
	Regulated area controls implemented
	Access to regulated area limited to authorized employees
	Decontamination and maintenance procedures
	Emergency procedures
Regulated Area Criteria	
	Inspection: annually
	Fume Hood Face Velocity verified
	Local exhaust ventilation with sufficient clean make-up air for proper operation
	Work surfaces protected with absorbent paper and/or other protective material
	Storage containers labeled as required by standard
	Waste containers labeled as required by standard
	Entrances to regulated area posted with any signs as required by regulation
	Current inventory maintained
Housekeeping	
	Dry sweeping of dry chemicals is prohibited
Decontamination and Disposal	
	Contaminated materials disposed of by QE
Administrative Controls	
	No eating, drinking, smoking, application of cosmetics, chewing tobacco, taking oral medication, or storage of consumables.
	Wash hands, forearms, face and neck upon exit from regulated area
	No pipetting by mouth
Personal Protective Equipment	
	Documented PPE assessment
	Lab coat or other full body garment, safety glasses, gloves required
	PPE collected in impervious containers at end of day for decontamination or disposal
	Respiratory protection: contact the Safety Division for evaluation

Training of personnel	
	Training requirements specific to the OSHA regulated carcinogen, can be incorporates into either Hazard Communication or Chemical Hygiene program training, as long as specific standard requirements are documented in the training.
	Frequency: initial, then annually or when new carcinogen introduced or operation changes significantly.
Medical Surveillance	
	Requirement varies by chemical; usually depends upon potential exposure. Contact the Safety Division for assistance

Table 3

Required Documentation	
Individual or Organization	Shall Maintain
Immediate Supervisor	• A current carcinogen inventory (may be in a computer database or on paper). • Documentation that is relevant to qualified chemical workers' job-specific training. • An approved, current safety plan (e.g. Job Hazard Assessment, Laboratory Safety Plan, PPE assessment, etc.) describing carcinogen use. • Completed carcinogen use forms (Appendix A), one for each carcinogen in use. • Carcinogen use sampling data results memoranda from QH, if sampling was performed.
Safety Division	• This chapter and the carcinogen list. • Copies of completed carcinogen use forms. • Employee- and workplace-exposure-monitoring (sampling) records. • Copies of carcinogen use sampling data results memoranda sent to immediate supervisor.
Ames Health Unit	• Carcinogen medical surveillance records for civil servants.

38.7.2 Related Programs at ARC

Operations involving chemical carcinogens are subject to many programs, which provide for safety in areas related to use of hazardous materials. The procedures and policies listed below complement and coordinate with implementation of the OSHA-Regulated Carcinogen Program.

Asbestos Management	APG 1700.1, Chapter 30
Chemical Hazard Communication Plan	APG 1700.1, Chapter 24 (Ames HAZCOM)
Chemical Hygiene Plan	APG 1700.1, Chapter 13
Respiratory Protection	APG 1700.1, Chapter 28 (Respiratory protection)
Bloodborne Pathogens Protection	APG 1700.1, Chapter 32 (Bloodborne pathogens)
Confined-Space Entry Program	APG 1700.1, Chapter 26 (Confined space)
Hazard Assessment and Personal, Protective Equipment	APG 1700.1, Chapter 33 (PPE)
Environmental Management	Ames Environmental Procedures and Guidelines, APG 8800.3 (Code Q)

38.8 Review and Update

The Safety Division will review this chapter periodically. Revisions will incorporate new regulatory requirements and substantially modified procedures initiated since the previous update.

38.9 Appendices

Appendix A: Regulated Carcinogen Use Questionnaire

38.9.1 References

ACGIH (American Conference of Governmental Industrial Hygienists). "TLVs and BEIs," Cincinnati, Ohio, most recent edition.

California Proposition 65 (1986), "The Safe Drinking Water and Toxic Enforcement Act of 1986." http://www.oehha.org/prop65/p65.htm.

International Agency for Research on Cancer. "Monographs," most recent editions. National Toxicology Program (NTP), "Annual Report on Carcinogens."

OSHA (Occupational Safety and Health Administration). "Toxic and Hazardous Substances," 29 CFR. 1910.1001-1050, Subpart Z, Washington, DC.

38.9.2 Appendix A: Regulated Carcinogen Use Questionnaire

Please complete a separate questionnaire for each work area and process where a regulated occupational carcinogen is used. Feel free to copy or print this questionnaire as many times as necessary.

Name: _____ Title: _____
Department: _____ Mail Stop: _____
Building Number: _____ Room Number: _____
Phone Number: _____ Supervisor: _____
Chemical Name: _____
Monthly Usage: _____
Brief Description of Process: _____
_____
_____
_____
Duration of Project: _____
Are engineering controls, such as fume hoods or other local exhaust ventilation, used to control chemical exposure **throughout** the process? **YES** **NO**
If no, explain: _____
Description of engineering controls: _____
How often is this chemical used in the workplace? _____
For how long? _____
How many employees are directly involved with this work activity? _____

Name	SSN	Employer	Date Trained

List the type of personal protective equipment used, or attach a copy of the PPE Assessment?
_____
How many employees are **not** directly involved with this work activity, but work in the same area?____
An approved, current safety plan, (e.g. Job Hazard Assessment, Laboratory Safety Plan, PPE Assessment, etc.) describing carcinogen use is located: _____
All use of OSHA-regulated carcinogens listed above will be used in conformance with the requirements listed in this chapter:

_____
Signature Date

END OF DOCUMENT